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IS 13435-5 (1992): Acrylic based polymer waterproofing material - Methods of test, Part 4: Determination of Minimum Film Forming Temperature and White Point [CED 41: Waterproofing and Damp-Proofing]



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भारतीय मानक

एक्रिलिक पर आधारित पॉलिमर
जल-सह सामग्रियाँ — परीक्षण पद्धति

भाग 5 फिल्म रूपण की न्यूनतम तापमान एवं सफेद बिन्दु ज्ञात करना

Indian Standard

ACRYLIC BASED POLYMER WATERPROOFING
MATERIALS — METHODS OF TEST

PART 5 DETERMINATION OF MINIMUM FILM FORMING TEMPERATURE
AND WHITE POINT

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BUREAU OF INDIAN STANDARDS
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FOREWORD

This Indian Standard (Part 5) was adopted by the Bureau of Indian Standards, after the draft finalized by Waterproofing and Damp-proofing Sectional Committee had been approved by Civil Engineering Division Council.

Acrylic based polymers are now extensively used in the country for waterproofing and damp-proofing purposes necessitating the need of formulating a specification on the product. For evaluating the quality and performance characteristics of the product, standardized test methods are necessary to guide manufacture and users of the product.

Methods of tests for acrylic based polymer water proofing materials have been covered in following parts:

- Part 1 Determination of solid content
- Part 2 Determination of coarse particles
- Part 3 Determination of capillary water take-up
- Part 4 Determination of pH value
- Part 5 Determination of minimum film forming temperature and white point
- Part 6 Alkali resistant test

While formulating the above standards the Committee has taken into consideration the facilities available in the country and the practice prevailing in other countries.

In the formulation of this standards, assistance has been derived from the following publication:

ISO 2115 : 1976 Plastics — Aqueous dispersions of polymers and co-polymers —
Determination of white point temperature and minimum film forming temperature.

In reporting the results of a test or analysis made in accordance with the final value, observed or calculated is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

*Indian Standard***ACRYLIC BASED POLYMER WATERPROOFING MATERIALS — METHODS OF TEST****PART 5 DETERMINATION OF MINIMUM FILM FORMING TEMPERATURE AND WHITE POINT****1 SCOPE**

1.1 This standard describes the method for the determination of the white point temperature of aqueous dispersion of acrylic based polymer water proofing material and the minimum film forming temperature.

2 TERMINOLOGY

2.1 For the purpose of this standard following definitions shall apply.

2.2 Minimum Film Forming Temperature (MFT)

The limiting temperature above which a continuous homogeneous film without cracks is formed.

2.3 White Point Temperature (WP)

The limiting temperature below which an opaque mass and above which a transparent film is formed.

3 PRINCIPLE

The principle of the method is to spread out one or more films of the dispersion on a metal plate (aluminium, stainless steel or copper) either level and smooth or channelled from one side having higher temperature to other side having lower temperature to form a suitable temperature gradient. Subsequently it is dried with a current of moisture free air and determination of the temperature at which the transparent section of the dispersion meets the white section.

4 APPARATUS**4.1 Coating Bench**

4.1.1 Test apparatus (*see* Fig. 1) consisting essentially of a rectangular plate, of aluminium, stainless steel or copper, whose surface may either be perfectly level and polished, or may contain channel 0.3 mm deep and 20 mm wide.

4.1.2 At one end of the plate is a rheostat controlled electrical resistance which constitute the hot source. At the opposite end is cold source, consisting either of an insulated container in which refrigerant is placed or of a coil inserted into the end of the plate and through which refrigerant mixture is circulated.

4.1.3 Evenly spaced along the plate are holes into which thermometers may be inserted to measure the temperature gradient of the plate when the equilibrium is reached. The first hole is positioned at the cold end of the plate at right angles to the beginning of the channel, if the plate has them.

4.1.4 Provision should be made for placing glass cover above the plate, leaving space through which can be directed a slight current of dry air dried, for example, by passing through a column packed with Calcium chloride at room temperature, from the cold end to the hot end.

4.2 Devices for Temperature Measurement

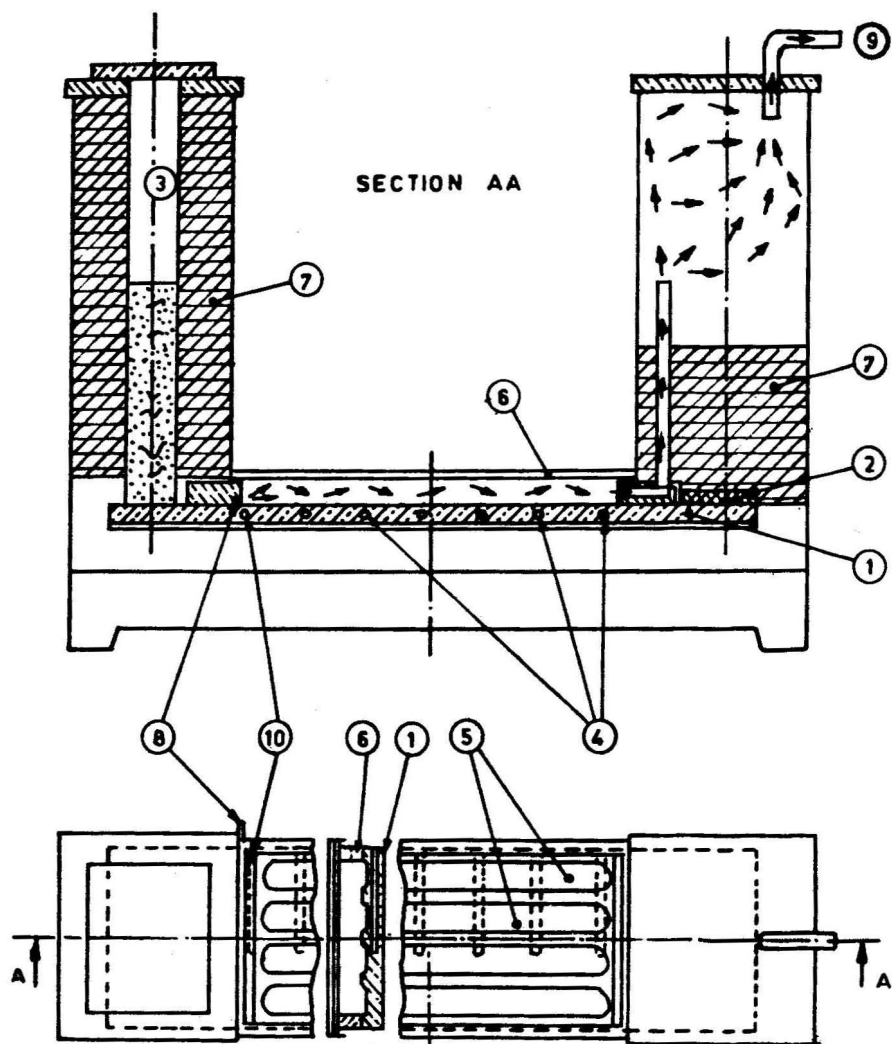
For temperature measurements mercury thermometer, resistance thermometer or thermocouples, semi-conductor probes are used to measure the temperature at the surface of the sheet. The range of temperature measured is -10°C to $+15^{\circ}\text{C}$ with an accuracy of 0.1°C .

4.3 Film Spreader

The film spreader shall be made of stainless steel, capable of producing simultaneously and successively either films in the channels or films about 0.1 mm thick and 20 to 25 mm wide as plates without channel.

5 PROCEDURE**5.1 Setting the Temperature Gradient**

5.1.1 The devices for temperature measurement shall be put in place.



KEY

- | | |
|--|---------------------------|
| 1 Rectangular Metal Plate | 6 Glass Cover |
| 2 Electrical Resistance | 7 Insulating Material |
| 3 Reservoir for Refrigerant Mixture | 8 Dry Air Inlet |
| 4 Holes for Thermometers (Diameter 0.5 mm) | 9 Air Outlet |
| 5 Channels in the Upper Surface of the Plate
(Depth 0.3 mm) | 10 First Thermometer Hole |

FIG. 1 DIAGRAM OF TEST APPARATUS GIVEN AS AN EXAMPLE
(THE PLATE IN THIS DIAGRAM IS CHANNELLED BUT THIS FEATURE IS NOT ESSENTIAL)

5.1.2 The heat source and the cooling medium shall be regulated to ensure the correct temperature gradient in polymer dispersion to be tested. The temperature should drop by 20° to 40° C and remain constant during the test. The temperature range shall be adjusted so that MFT occurs roughly in the centre.

5.1.3 The temperature gradient shall be linear, that is, if equal distances are taken, the pressure drop over each should also be equal.

5.2 Determination of MFT and WP

5.2.1 When using a level plate, the dispersion shall be spread out with the film spreader starting from the end with the highest temperature. The dry coat thickness shall be 0.10 to 0.15 mm and the width of the coat shall be 20 mm.

5.2.2 In the case of the channelled plate, poured into the channel, at the end of the plate with the highest temperature and shall be spread out using the film spreader.

5.2.3 Afterwards, the sheet of metal is covered by the glass plate, and the polymer dispersion is allowed to dry either by allowing a current of dried air to flow slowly over the sheet at a constant rate from cold to heated one or by placing silica gel with a moisture indicator in the air space above the polymer dispersion.

5.2.4 After the dispersion has dried, the temperature shall be measured at that point on the bench at which boundary of the white layer has formed or at which a cohesive film just commences to form,

5.2.5 After complete separation of the section transformed into the film (transparent) and untransformed section (white) is visible, distance between the first point of temperature measurement and the line of separation shall be measured.

5.2.6 The temperature indicated by various devices shall be noted and a graph using distance intervals between devices as the abscissa and the plate temperature as the ordinate shall be plotted.

NOTE — If the temperature gradient is linear the curve obtained is straight line and in practice it is then unnecessary to plot a graph.

5.2.7 Using the graph, the white point, temperature shall be determined. If a surface thermometer is used the white point temperature may be determined directly.

5.2.8 The lowest temperature where a continuous homogenous film without groups is formed shall be determined to the nearest degree celsius. This is the minimum film forming temperature.

6 REPORTING OF THE RESULT

The test report shall give the following informations:

- The identification characteristics of the dispersion tested,
- The type of testing apparatus,
- The value of white point temperature in degree celsius, and
- The minimum film forming temperature in degree celsius.

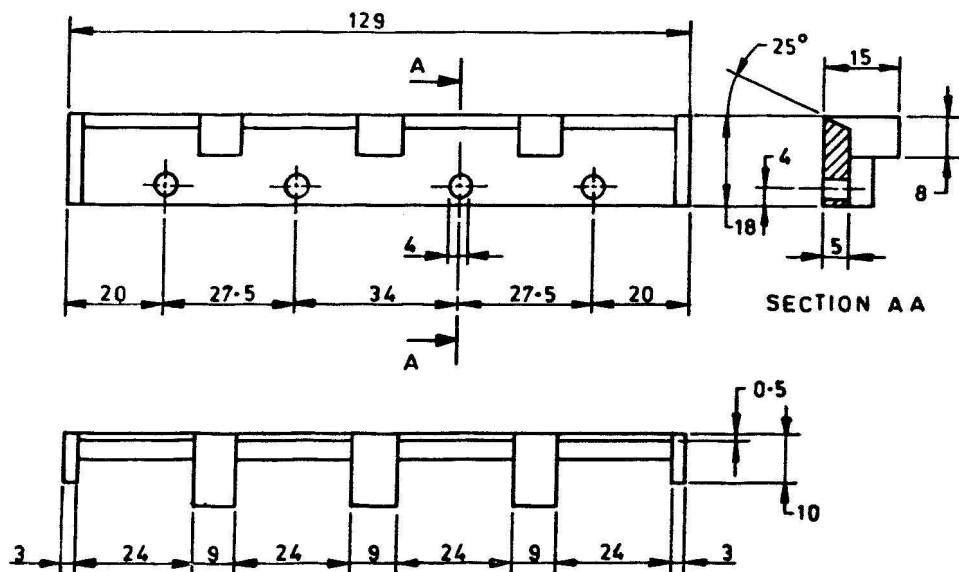


FIG. 2 EXAMPLE OF A FILM SPREADER FOR A CHANNELLED PLATE

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